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10 CFR 50.73

March 22, 2016  
NRC-16-0016

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-0001

Reference: Fermi 2  
NRC Docket No. 50-341  
NRC License No. NPF-43

Subject: Licensee Event Report (LER) No. 2016-002

Pursuant to 10CFR50.73(a)(2)(v)(D) and 10CFR50.73(a)(2)(vii), DTE Electric Company (DTE) is submitting LER No. 2016-002, Both Residual Heat Removal Low Pressure Coolant Injection Divisions Inoperable Due to Inoperable Injection Valve.

Should you have any questions or require additional information, please contact Mr. Alan I. Hassoun, Manager Nuclear Licensing of my staff at (734) 586-4287.

Sincerely,

Keith J. Polson  
Site Vice President

Enclosure: LER 2016-002, Both Residual Heat Removal Low Pressure Coolant Injection Divisions Inoperable Due to Inoperable Injection Valve

cc: NRC Project Manager  
NRC Resident Office  
Reactor Projects Chief, Branch 5, Region III  
Regional Administrator, Region III  
Michigan Public Service Commission  
Regulated Energy Division (kindschl@michigan.gov)

**Enclosure to  
NRC-16-0016**

**Fermi 2 NRC Docket No. 50-341  
Operating License No. NPF-43**

**LER 2016-002, Both Residual Heat Removal Low Pressure Coolant  
Injection Divisions Inoperable Due to Inoperable Injection Valve**



## LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

## 1. FACILITY NAME

Fermi 2

## 2. DOCKET NUMBER

05000

341

## 3. PAGE

1 OF 4

## 4. TITLE

Both Residual Heat Removal Low Pressure Coolant Injection Divisions Inoperable Due to Inoperable Injection Valve

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED			
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER		
01	22	2016	2016	002	00	03	22	2016	FACILITY NAME	DOCKET NUMBER		
										05000		
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
1			<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
			<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
			<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
			<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)	
10. POWER LEVEL  100			<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)	
			<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)	
			<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> 73.77(a)(1)	
			<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)		<input type="checkbox"/> 73.77(a)(2)(i)	
			<input type="checkbox"/> 20.2203(a)(2)(vi)			<input type="checkbox"/> 50.73(a)(2)(i)(B)			<input checked="" type="checkbox"/> 50.73(a)(2)(vii)		<input type="checkbox"/> 73.77(a)(2)(ii)	
						<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A			

## 12. LICENSEE CONTACT FOR THIS LER

## LICENSEE CONTACT

Alan I. Hassoun, Manager Nuclear Licensing

## TELEPHONE NUMBER (Include Area Code)

(734) 586-4287

## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO15. EXPECTED  
SUBMISSION  
DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On January 22, 2016, at 1923 EST, both divisions of the Residual Heat Removal (RHR) system were declared inoperable for the Low Pressure Coolant Injection (LPCI) mode of operation due to a failure of the division 1 LPCI outboard injection motor operated valve (MOV), E1150F017A. While performing the division 1 RHR pump and valve operability surveillance test, E1150F017A closed properly but failed to open during its required stroke time test. With this valve closed and unable to automatically open, LPCI injection into the Reactor Pressure Vessel (RPV) from both divisions of RHR would be prevented if the LPCI loop select logic selected the division 1 recirculation loop for injection; therefore, this failure rendered both divisions of RHR inoperable for the LPCI function. Technical Specification limiting condition for operation (LCO) 3.5.1, Condition K, was entered, which requires immediate entry into LCO 3.0.3. The cause of the failure was subsequently identified as a foreign material (screw) that affected the function of the MOV contactor. The root cause was determined to be less than adequate inspection procedures and susceptibility of the contactor to foreign material. Inspection of all other susceptible equipment is ongoing to tighten loose screws and a modification is planned to install Foreign Material Exclusion (FME) barriers.

# **LICENSEE EVENT REPORT (LER) CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER								
Fermi 2	05000- 341	<table border="1"> <tr><th>YEAR</th></tr> <tr><td>2016</td></tr> </table>	YEAR	2016	<table border="1"> <tr><th>SEQUENTIAL NUMBER</th></tr> <tr><td>002</td></tr> </table>	SEQUENTIAL NUMBER	002	<table border="1"> <tr><th>REV NO.</th></tr> <tr><td>00</td></tr> </table>	REV NO.	00
YEAR										
2016										
SEQUENTIAL NUMBER										
002										
REV NO.										
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## **Initial Plant Conditions:**

Mode 1  
Reactor Power 100 percent

There were no inoperable Structures, Systems, or Components at the start of the event that contributed to the event.

## **Description of the Event**

On January 22, 2016, at 1923 EST, both divisions of Residual Heat Removal (RHR) [BO] were declared inoperable for the Low Pressure Coolant Injection (LPCI) mode of operation due to a failure of the division 1 LPCI outboard injection motor operated valve [ISV], E1150F017A. While performing the division 1 RHR pump and valve operability surveillance test, E1150F017A closed properly but failed to open during its required stroke time test.

The Fermi 2 accident analysis takes credit for the proper operation of the LPCI loop select logic during a loss of coolant accident (LOCA). The loss of coolant event involves the postulation of a spectrum of piping breaks inside the primary containment, varying in size, type, and location. The most severe nuclear system effects and the greatest release of material to the primary containment result from a complete circumferential break of one of the two reactor recirculation loop [AD] pipe lines. This is the design basis accident (DBA). Since the LPCI system injects water into the reactor vessel [RPV] through the discharge piping of one of the recirculation loops, a loop selection logic is provided to ensure that the water is injected into an unbroken loop. The loop selection logic compares pressure on the two recirculation loops. A broken loop will indicate a lower pressure than an unbroken loop. The loop selection logic directs the LPCI injection into the high pressure (unbroken) loop. The loop selection is effected through the operation of the RHR injection valves.

Valve E1150F017A is a normally open RHR injection valve in series with the inboard E1150F015A valve. These valves control the RHR LPCI flow into reactor recirculation loop A. Because the valve failed in the closed position, flow would be inhibited into the A recirculation loop for scenarios where a break is detected in loop B. Therefore, both divisions of RHR were declared inoperable for the LPCI function at 1923 EST on January 22, 2016. Technical Specification 3.5.1, Condition K was invoked and limiting condition for operation (LCO) 3.0.3 was immediately entered.

Trouble shooting determined that the control power [JS] closing contactor did not have full freedom of movement because of foreign material. The contactor was removed from the Motor Control Center (MCC) and was manually cycled on a workbench. While manually cycling the contactor, a screw fell out of the contactor. The screw apparently fell into the contactor from a Control Relay (CR) located above the contactor in the MCC. At approximately 2143 EST, the E1150F017A valve was re-tested satisfactorily. The valve properly closed and opened, meeting required Inservice Inspection (ISI) stroke time acceptance criteria. At 2145 EST, both divisions of RHR were declared operable for the LPCI and LCO 3.5.1, Condition K and LCO 3.0.3 were exited.

## LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Fermi 2	05000- 341	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	002	00

An 8 hour event notification number 51676 was made pursuant to 10CFR50.72(b)(3)(v)(D) on January 23, 2016, 0020 EST, to the NRC Operations Center. Reactor Power was maintained at 100 percent throughout the event.

This report is being made pursuant to 10CFR50.73(a)(2)(v)(D) as a condition that could have prevented the fulfillment of a system safety function needed to mitigate the consequences of an accident. In addition, this report is being made pursuant to 10CFR50.73(a)(2)(vii) as an event where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to mitigate the consequences of an accident.

### Significant Safety Consequences and Implications

The safety function of the LPCI mode of the RHR system is to inject water from the suppression pool into the reactor vessel via injection lines connected to the reactor recirculation piping following a large break LOCA. Since a large break LOCA could occur in either one of the two reactor recirculation loops, the LPCI loop select logic function is designed to select the undamaged reactor recirculation loop for LPCI injection. Under the conditions of this event, with the Loop A outboard injection valve closed and unable to open, had a LOCA occurred in recirculation loop B or elsewhere in the reactor connected piping systems in containment, the automatic LPCI injection to the reactor vessel would have been prevented.

Inoperability of the E1150F017A valve, for approximately one hour and 50 minutes, rendered both divisions of LPCI inoperable. However, during that period of time the core spray and standby feedwater systems were available to address large break LOCA events. The high pressure coolant injection, reactor core isolation cooling, and standby feedwater systems were also available to address any small break LOCA scenarios that could have occurred at that time. The event was of low safety significance considering the short duration; therefore, the health and safety of the general public were not adversely impacted.

### Cause of the Event

A Root Cause Evaluation determined that the technical requirements to check all fasteners for looseness were not adequately implemented into Maintenance work instructions (procedures) for MCC inspections during Preventative Maintenance. Additionally, the General Electric (GE) CR305 contactor orientation inside the MCC created a susceptibility to foreign material. When the contactor is mounted horizontally, an opening is created where foreign material can fall into the contactor.

The contributing cause was that previous Corrective Action Program documents/products did not adequately identify the cause of similar previous events and did not effectively implement corrective actions to minimize recurrence.

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YEAR										
2016										
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## **Corrective Actions**

The foreign material was removed and the MCC bucket was restored and tested satisfactorily. The MCC was independently inspected for additional foreign material and all other screws on the relay were tightened. Four procedures will be revised to include instructions to check accessible spare terminal screws for tightness. The revisions will be complete by May 31, 2016.

Additional corrective actions include personnel training and the inspection of Engineered Safety Feature (ESF) MCC positions with CR120B relays for loose or missing screws and for susceptible contactor orientation. All screws will be tightened during the inspections and a Design Change will be implemented to modify the susceptible MCC contactors with a permanent FME barrier. Initial visual inspections are complete. All corrective actions will be completed by the next refueling outage (RF18), scheduled for spring 2017.

## **Additional Information:**

A. Failed Component Data:  
None.

B. Previous Similar Events:  
LER 2005-004, "Both Residual Heat Removal Low Pressure Coolant Injection Divisions Inoperable Due to Valve Failure," was submitted when the E1150F017B, the Division 2 LPCI outboard injection valve, failed to open. The cause of the failure was high resistance on the open contactor auxiliary interlock contact. Therefore, the corrective actions for LER 2005-004 would not have prevented the current event.

Actions taken in response to Condition Assessment Resolution Document 06-22311, which identified a foreign material that impacted the operation of a similar contactor were not effective to prevent the occurrence of this event.